

AVIATION WEEK

MAR. 28, 1949

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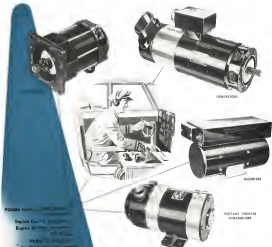
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 means more uniform
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Hanked Troubles

Highly rated operators of some non-scheduled airlines on the New York Puerto Rican run are continuing to produce some trouble.

"Travelers" Ltd. Society reports repeated instances in which planeloads of Puerto Ricans have been left stranded for up to 24 days at a Miami airport with no money for food or lodging. On one occasion, the society asserts, an irregular operator Ray C. Puerto Ricans from New York to Miami but refused to take them on to San Juan because the agency in New York which had sold the tickets had not telegraphed money due the pilot. "Travelers" did lead the hungry passengers.

About the same time, one group of 42 and another of 51 Puerto Ricans were stranded without funds at Florida ports because their planes developed engine trouble.

DME Specs

International agreement on development specifications for ultra high frequency data-link communications equipment was reached during recent meetings in Montreal of the Communications division of ICAO.

Group adopted the specifications proposed by the U. S. Radio Technical Commission for Aeronautics with such minor technical changes.

Traffic Control

One of the big arguments in finalizing out details of the development of all-weather electronic warning system will be over who will control the dispatch and arrival of aircraft using the system.

Airline has bitterly fought up at through the Civil Aeronautics Administration to control dispatching of aircraft and will probably make an issue of any new attempts to take that function away from individual airlines in the new ways and traffic control system.

USAF Errors

U. S. Air Force is blaming one of its own private war's overcompensation mechanism for the situation that a USAF study developed that it was impossible to develop an intranational leader within the next 6-8 years.

Statement appeared in Gen. Hoyt Vandenberg's report for fiscal 1966 (Aviation Week, Jan. 17) along with the conclusion that USAF would have

NEWS SIDELIGHTS

Split Decision

A split decision on the USAF trainer plane competition may result in both Fairchild and Beech getting contracts for parts of the trainer order, according to Pentagon sources last week.

Fairchild's entry, powered with a 195 hp Lycoming engine, (variant of the XM24 trainer originally designed for the Navy) and the Beech Model 41, powered with a 185 hp Continental, (amplified development of the commercial Bonanza) were reported closely competitive in performance, at least tests conducted recently at Wright Field.

Fairchild ground Beech trainer had been previously procured by company at around \$28,000. No other Fairchild nor Beech bid prices were disclosed but it was understood, Fairchild price was about \$23,000 higher.

to depend on cost referring to achieve the target required for intranational leading operations. These statements later proved somewhat embarrassing to a USAF engaged in selling the C-119B to an intranational member.

USAF explanation is that a severe two-year ground-up from a 1947 report concerning the specific range performance of the B-52 which was then being considered as a 400,000 lb. bomber. Powerful progress since that report was written has convinced USAF that it is possible for a smaller version of the B-52 to attain the range once believed impossible by the USAF report.

PRO Puzzle

Considerations of all military public relations activities in a single group under the direct thumb of the Secretary of National Defense is stirring mixed reactions in Washington.

Some observers believe it will mean a tighter security clamp aimed more at preventing embarrassment to the military than protecting legitimate military secrets.

Other Washington releases predict a flood of official leaks to the official security data. Many are disbelieving over last fall's protest for the public relations consolidation was the all legal disclosure of USAF plans for non-banking key Russian sites in current daily newspaper stories.

Actually Benjamin Wynn, a McGraw

Hill publication, published on Aug. 9, 1965, the story of Operation Avails, the USAF plan for storming key Russian targets, with the notation that this information was being leaked all over Washington at that time.

Haylift Bill

An House bill of \$30 million for its steel-reheated "Operation Haylift" has called most writers Congressmen on the subject.

USAF has informed them that the cost will be approximately \$100 for each ton of hay dropped in snowbound livestock lands during the recent mountain snow disasters. This is aside from the cost of the hay.

"The operation did give valuable training experience, we are told, and I suppose it does deserve credit for keeping some cattle and sheep alive and perhaps saving some lives by dropping supplies," one western Congressman stated. "Of course the only thing we are sure of is that it killed a couple of people with hay beams—and gave the Air Force good publicity."

Lendis Prods PAA

Former CAB Chairman James M. Landis, who slowly has kept the Pan American Airways-American Overseas Airlines merger for the federal air agency transferable, at hand of work setting up new guidelines. PAA and AOA have indicated that under a decision on the merger appears likely by Sept. 15 or soon thereafter may be called off.

Most observers believe the prospects of meeting this deadline are dim. Landis, who apparently AOA employees opposed to the North Atlantic route transfer deal, led in his effort to have CAB discuss its proposed combination of the route. But he is now demanding that PAA be required to provide information on data which might prove useful embarrassing to Pan American if made public.

Part of the material requested deals with PAA's alleged attempts to frustrate government policy by hampering the operations of competing U. S. flag lines controlled over North Atlantic and South American routes.

Other data sought by Landis deals with Pan American's bookkeeping practices, allegedly antiquated and not in accord of actual need and reported.

PAA asserts that Landis is asking improper use of confidential information from Pan Am, calls available to him as CAB chairman.

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hermetically
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Aircraft Fire
and Over-Heat Detectors
SENSITIVE...but only to heat

AVIATION CALENDAR

Apr. 10—**Los Angeles** of Automotive Engineers national convention and the business meeting, Hotel New Yorker, New York.

Apr. 14—**Los Angeles** Motor Company and Engineering Association of America meeting for Motor Vehicle Club Automobile Los Angeles, Calif.

Apr. 16—**FTS** annual meeting of the American Association of Automotive Engineers, McCormick Hotel, Chicago.

Apr. 18—**LA** (AEE) national meeting, Sheraton Hotel, Los Angeles, Calif.

Apr. 19—**LA** National Automobile Conference, McCormick Hotel, Los Angeles, Calif.

Apr. 20—**LA** American Association of Automotive Engineers, McCormick Hotel, Los Angeles, Calif.

Apr. 21—**LA** (AEE) national meeting, Sheraton Hotel, Los Angeles, Calif.

Apr. 22—**LA** (AEE) national meeting, Sheraton Hotel, Los Angeles, Calif.

Apr. 23—**LA** (AEE) national meeting, Sheraton Hotel, Los Angeles, Calif.

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Apr. 39—**LA** (AEE) national meeting, Sheraton Hotel, Los Angeles, Calif.

Apr. 40—**LA** (AEE) national meeting, Sheraton Hotel, Los Angeles, Calif.



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This is it . . . the element answer to your aviation radio requirements. Here is a transmitter of minimum weight that puts out. And a receiver of minimum weight that brings in the signals . . . through all sorts of weather. Here, no matter, are two of the latest communication units yet designed and built . . . with no engineering effort spent to make them so.

About the Transmitter AVT-49—This completely self-contained unit delivers 50 watts of power, voice or cw, over a frequency range of 2.45 to 12 mc. It provides automatic band change—like a choice of four independent power sets, crystal-controlled frequencies. Weight? Only 62H pounds, completely installed. Size? One about ATE . . . fits any standard airline rack. Available for either 15- or 24-volt operation. Everything neatly controlled.

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Engineered, built, and built for operation as a complete system . . . or individually, these units have passed the type tests for CAA certification. Get full information from your RCA Distributor, or from Dept. VCL, Aviation Services, RCA, Camden, N. J.

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RCA Aircraft Transmitter
type AVT-49

Transmitter Control
for type AVT-49



RCA Aircraft Receiver
type AVR-22

Receiver Control
for type AVR-22

NEWS DIGEST

DOMESTIC

Consolidated Veeva Aircraft Corp. has changed the status of its subsidiary set up to lease transport planes. New title is Aeroflex, Inc., and according to present plans headquarters will be established in Albuquerque, N. Mex.

Civil Aeronautics Board ordered five landings and one helicopter operator (Yellow Cab Co. of Cleveland) to begin service on three restricted routes by July 1. Routes are: Palo Alto, Calif., East St. Louis, Ill.; Central Airlines, Oklahoma City, Texas; Turner Aero-transport Corp., Indianapolis, Iowa; Airplane Co., Inc., Miami, and Aircoast Airways, Phoenix.

Post Office Department announced it CAB purchasing conference that it will not support helicopter mail service in New York City area. Conference was in accordance with some applications proposing service similar to that now being authorized for Los Angeles and Chicago.

FINANCIAL

Lockheed Aircraft Corp. reports profit of \$6,739,586 for year ended Dec. 31 on sales of \$175,620,768, of which 75 percent was military, the balance commercial. Earnings equaled 55.80 per share. Year end employment was 15,007, and backlog \$185,901,000.

Douglas Aircraft Co. reports profit of \$5,629,206 for year ended Nov. 30, 1948, on sales of \$108,581,867, earnings equaled 37.21 a share. Sales were mainly 514 machines under the previous year. Nov. 30 backlog was \$272,009, or 334 million from the fiscal 1947 figure. Air Force orders make 41 per cent of the total, Navy business, 34 percent.

Republic Aviation Corp. reports profit of \$2,196,471 for year ended Dec. 31 on sales of \$49,816,896. In 1947, company lost \$2,679,165 on sales of \$18,300,577. Mar. 1, 1948, backlog was \$12 million.

Grumman Aircraft Engineering Corp. reports profit of \$2,953,311 for year ended Dec. 31 on sales of \$48,871,669. Of the \$182 million backlog as of Dec. 31, \$187 million was in uncompleted contracts and the balance in letters of intent on which company had not yet received actual contract.

FOREIGN

Belgian test pilot George Peugy is leaving for the B-50 at Ft. Worth in preparation for test flying the Beaufort Bomber, which has a span (230 ft.) equal to the B-50 and weighs only 93,000 lb. less (750,000 to 290,000 lb.)

INDUSTRY OBSERVER

Look for civilian pilot racing planes to make their first appearance in the motor events of the National Air Races, probably in 1951. Racing pilots and show management appreciate that the two-places piston-engine lighter competition has gone about as far as it can go, and the proposed revision to smaller horsepower limitations may be shown again if enough development progress is made soon on small jet powerplants.

Canada Ltd., Montreal, is expected to obtain orders for another 19 DC-4 aircraft from British Overseas Airways Corp. to take the place of grounded BOAC T-400 aircraft. While no definite order has been placed yet, opinion at Montreal points to first possible dispatchment with completion of the 22 aircraft Canada is now building for BOAC.

Belknap has new drag prototype of two new wing-type jet fighters: 31-5, low wing swept-wing fighter in production (F-84) and three other types being in experimental models (XF-88, XF-70 and XF-90). The Hecker P-102 is a swept-wing version of the company's earlier XF-70 model and is powered by a single Bell Boyer Ne-10 turbojet. The Hecker S-10, another Ne-10-powered fighter is the swept-wing version of the Straker (Aviation Week, Feb. 14). A new version of the Warfield Wyvern powered by a Bell Boyer Glider turbo-prop engine is also being. The Wyvern was designed as a Royal Navy attack plane.

DeHavilland has made the first entry in a proposed England to New Zealand air race to be held in 1951. Arrangements for the race have not yet been completed but are expected to follow general lines of the England-Australia race of 1934. DeHavilland will indicate which of their planes will fly the race after arrangement details are settled.

Royal Air Force's latest bomber, the Avon Shackleton, made its first flight only in March. This was designed for long range reconnaissance functions of the RAF coastal command. It is powered by four Galloway piston engines.

Cessna's "Air Horse" helicopter has completed 2 hr. 30 min. of flight tests in addition to an 10 hr. running test on the ground. It is now being shipped for structural examination and strengthening of the main rotor.

Bel Aircraft Corp. is getting an additional \$300,000 in subcontracts from Boeing on the B-47 jet bomber production project. Bell's latest business will be manufacturing of new mechanical and electrical equipment for stabilizers and elevators. Bell also has a license sub-contract to build jet engine modules for the B-47.

Pratt & Whitney's XH-1, three versions of which are now being, is also a flying scale model of the XH-16 transport helicopter with detachable nose compartment. The XH-16 was originally developed for the U. S. Air Force but has become a joint USAF-Navy project since the helicopter will meet Marine requirements for a new transport type rotary wing aircraft.

Parts of the Chance Vought Catkins (XHTU-1) test jet Navy fighter that disappeared recently on a routine flight over Patuxent, Md., were found by fishermen in Chesapeake Bay and taken from there. The plane was lost near Northern Navy base. Chance Vought officials have been slow to determine the cause of the crash. Best guess based on evidence with one of the famed Maryland buzzards. Last known buzzard-Navy collision near Patuxent occurred off the tail of a McDonnell Phantom but pilot bailed out successfully.

United Helicopters' initial production of Heli 360 utility helicopters has reached assembly last production at the company's Palo Alto, Calif., plant, with the final machine nearing completion. First commercial delivery was made last month. At last report a demonstration on national tour was in Mexico and enroute to the East Coast to New York and Washington. In addition to direct sales, the national tour will produce operating maintenance test data and will enable several thousand guests to see the machine and have demonstrations of its "substantive safety."



AVIATION SECTION
RADIO CORPORATION of AMERICA
ENGINEERING PRODUCTS DIVISION, CAMDEN, N. J.

In Canada RCA VICTOR Company Limited, Montreal

AVIATION WEEK

March 20, 1949

Domestic Trunkline Traffic

Revenue Passenger Miles (AAR 808)

Carrier	1948	1947	Per Load Factor	1948	1947
American	1,191,068	1,779,323	60.6	30.3	
Boeing	193,806	199,434	54.2	61.6	
Capital	275,770	333,450	40.0	54.8	
City & Sea	329,171	311,445	56.5	38.4	
Columbia	36,194	37,815	61.1	61.4	
Continental	59,496	53,026	59.0	59.4	
Delta	281,162	208,048	121.1	60.7	
Eastern	565,281	894,160	19.9	60.1	
Eastern	18,152	17,120	59.0	64.6	
Mid-Continent	97,145	81,171	61.4	41.9	
National	86,412	137,341	60.0	54.7	
Norfolk	53,992	63,147	61.0	51.2	
Norfolk	321,251	346,875	59.1	60.0	
TWA	847,071	817,161	70.9	66.3	
United	1,155,074	1,288,189	67.4	73.3	
Western	356,962	366,196	15.0	62.8	
Total	7,422,146	6,813,626	19.5	65.7	

(Scheduled Operations Only)

While revenue passenger mileage declined, total number of passengers flown on domestic trunkline schedules rose from 32,376,051 in 1947 to 32,324,051 in 1948.

► **Flight at New York**—Scheduled domestic flight ton mileage reported by domestic trunkline began 15-213,990 in 1947 to 68,977,087 in 1948 as coordinated operations took the freight-carrying load away from their traditional competitors for the first time in the postwar period. Mail ton miles rose from 32,878,825 in 1947 to 37,503,853 in 1948, and express volume handled by domestic trunklines moved ahead slightly from 25,113,562 ton miles in 1947 to 28,768,883 last year.

In January, 1949, domestic trunklines flew 419,788,000 revenue passenger miles against 394,230,000 in the same 1948 month, when DC-6s were grounded. American Airlines rose the sharpest gain, passing from 74,605,000 to 99,896,000 revenue passenger miles. United's volume increased from 57,086,000 in January, 1948, to 71,751,000 in January, 1949 and Capital, Colonial, Delta, National and Northeast also showed gains.

Eastern Air Lines' revenue passenger miles slipped from 86,227,000 in January, 1948, to 78,436,000 in January, 1949, and TWA's domestic traffic from

Airline Traffic Tops 1948 Levels

Although domestic trunklines are flying more revenue passenger miles, overall deficits are still high.

By Charles Adams

A spectacular mile record and wide spread use of traffic producing traffic such as the first of the week finally has plus have pushed domestic airline passenger business noticeably above last year's levels.

But just how, the carriers have again started out on the wrong foot. Although revenue passenger miles flown by the 15 domestic trunklines increased more than 6 percent in January, 1949, over the same 1948 month, *Washpost* reports to date that overall deficits were still substantial.

► **American, UAL, Gain**—Carriers such as American Airlines and United Air Lines, which made a very poor showing during first quarter 1948 because of DC-6 grounding, achieved large passenger traffic gains in the first two months of this year. TWA and Eastern Air Lines, which benefited from DC-6 grounding last year, showed passenger traffic during the first two months of 1949 had dropped considerably.

First 1948 traffic figures show the 15 domestic trunklines flew 7,422,146 revenue passenger miles in scheduled service, down from 7,422,146 in 1947 to 6,813,626,000 mark set in 1947.

Average passenger load factor for long haul operations fell from 65.67 percent in 1947 to 59.54 percent last year.



1949 BOEING 707-120

CONFIDENT CANADIANS

Royal Canadian Air Force is apparently anxious that it will get North American P-54s as lightnings during 1949. The drawing of the P-54s with RCAF insignia and Royal 1949 RCAF fighters appear on the

cover of the February issue of the *Washpost*, which is the RCAF's official service journal. The RCAF, North American Airlines Inc. is negotiating with Canadian Civil and Foreign Dept. of Montreal, as an F-56 licensing agreement.

61,115,000 to 71,751,000. Mail ton mileage flown by the domestic trunklines was up 23 percent in January of this year over the same 1948 month, and freight ton mileage gained 35 percent. But an express volume fell 15 percent as considerable business shifted to air parcel post.

► **United Continues** in February—In domestic reports on February traffic in detail it was also ahead of the same 1948 month. United Air Lines through has announced that its domestic revenue passenger mileage in February was 72,145,800 against 53,199,000 in February of last year. Passenger traffic of American, National, Northeast and Colonial was an substantially over February, 1948, although TWA and Mid-Continent have not yet reported their own totals.

Meanwhile, a bond of CAG and pay orders has wiped out the domestic trunkline's operating deficit for 1948 which at one time had fell several dollars to the red. The deficit had been made up in 1947. The attractive and lures have not only given the industry a small operating profit for 1948 but have allowed several million dollars in deficit previously reported for 1947.

While the 16 domestic trunklines in a given year show a modest operating profit for 1948, they still have a sizable net deficit. The net will have to be made up by future attractive role of passengers.

► **Revenue Losses** Cut—Largely because of the sharply slanted deficit reported by American Airlines, the domestic trunkline net loss from 1948, according to less than \$4 million against more than \$5 million in January, 1948. American lost only \$155,000 in January of this year against a \$1,551,000 operating deficit in the same 1948 month.

Delta and National, which were well in the red during the first month of 1948, showed profits only this year.

► **King Lines Report**—U-3 international Reg. carriers operating over the North Atlantic report that traffic during the past month was the highest in history. Aided by special extension fares, American Overseas Airlines increased its revenue passenger mileage from 7,705,800 in January, 1948, to 12,225,000 in January, 1949. TWA flew 12,775,000 to 16,938,000, and Pan American Airways Atlantic service from 16,808,000 to 17,916,000.

TWA said that during January, 1949, it carried 20 percent more revenue passenger miles and 20 percent more northward than in January, 1948. In February the increases were 45 percent and 22 percent, respectively. TWA's January revenue was \$585,205 and international revenue in January, 1948, was \$544,626 in the same month this year.

► **Polish Airlines**—But any forecasting speculation of the last would be nearly impossible publicly in France today. Canadian and Canadian news would be sure to cause a suggestion. They could probably tell a

B-36 Changes Europe's Air Plans

Europeans feel importance of overseas bases to U. S. has lessened, so defense is up to Britain and France.

By Boyd Francis

(McGraw-Hill World News)

PARIS—A growing conviction among many European military strategists that the U. S. will be neither willing nor able to defend Western Europe against the Russian has put a new sense of urgency behind Western Europe's defense planning.

The B-36 is partly responsible for these new plans. Sir French agrees from this way.

The atom bomb is the key to U. S. grand strategy. U. S. is counting on a decisive blow to prevent the unbalanced balance of power from in the initial phase of any conflict with Russia. Until development of the B-36, the U. S. felt it had to have long-range, the Soviet blockade, then which to launch its plan-based bomber.

It was doubtful how long such bases could be defended from ground attack, but the U. S. could be counted on to make a good attempt at defending them.

Now, according to their French air strategists, the B-36 could conceivably strike Russia, strike centers from Western Europe's defense. Therefore, the U. S. or Europe may be forced to launch its attack to America's strategy. The U. S. can no longer be counted on to put up a real fight for them.

► **Defended by European**—Many military leaders are becoming convinced that Western Europe must be defended by Europeans if it is to be defended at all. But there are stumbling blocks in the way of Western Europe's defense.

National pride makes each country reluctant to sacrifice any part of its armed forces or the war industries be at the hands of greater specialization and efficiency. It is the case of the French aviation industry, the reluctance is particularly acute.

In the French conflict manufacturer of combat aircraft for Western Europe, the most highly developed French aviation industry, the French could thus specialize in the manufacture of aerial armament and precision instruments, for which, in some cases, it is better adapted than its British counterpart.

► **Politics a Factor**—But any forecasting speculation of the last would be nearly impossible publicly in France today. Canadian and Canadian news would be sure to cause a suggestion. They could probably tell a

decisive action of liberal opinion behind them, with appeals to French national pride.

National pride isn't the only strong bling block. Complete military specialization means taking a security gamble as the capacity of Western Europe as a whole to defend itself successfully. If any member of the Western alliance were to be the only one to defend itself, the advantages of defense of production for defense might decline.

► **Sessions Danger**—French and British military men take this danger seriously. The British don't want to turn out all manufacturing of aerial armament to France if the chances are heavy that France would be overrun by the Red Army in the first weeks of combat.

The French feel the same was about letting British manufacture of Western Europe's fighter aircraft. They point out that the British fighter planes are in short need for spare parts.

The Western countries sacrificed aerial national sovereignty in planning a decisive aerial attack (American War, Mar. 12) when tradition is not to risk and transportation not so far as even at this current extent the danger of cooperation to enter defense field, some military strategists have been loath to transfer. Western Europe will at least know what it is, if it can.

NAA Asks Revival Of USAF Jet Race

Revival of USAF jet plane should come racing over a course with down short turns was recommended for the 1949 National Air Races at Cleveland, Sept. 3, 4 and 5, by the National Aeronautics Association committee.

USAF withdrew its fighters from closed-circuit competition at the Cleveland race last year because of the comparatively testing plans and pilots lost in the tight closed-circuit jet Thompson race in 1947.

► **Naval in British**—Continuation of Navy jet participation in the British coast country was from the West Coast of Cleveland, recommended for 1949. It was proposed that British planes start from Runway Dry Lake, 35 mi. south of Los Angeles, to provide some for simultaneous launch in a moderate turn. Under this arrangement the first plane to cross the finish line at Cleveland would be the winner.



The Birdmen's Perch

by Major Al Williams, AUSA, "TATTERED WING TPS,"
Gulf Aviation Products Manager, Gulf Bldg., Pittsburgh 30, Pa.



Hurry, hurry, hurry!

Hurry and write in for your free picture of the Gullbirds before it's too late.

One of these great Gullbirds is already in the Smithsonian Institution; the other one takes off from a standing start in less than 254 seconds which makes them both unique—no hurry, hurry!

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Send a post card, a letter, a reader request, or a broadcast message to the ad department and we'll send the pictures to you with courtesy haste.

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SHORT STORY

This episode features, *Gullbirds Aviation*.



Series D, was tested in the lab and on the field for 6 years before we were sure that it would do everything that a balance should do for instrumented tests.

In addition to Alchier Precision (which removes most of the standardizing components from the cell), Gulf-Aviation Series D contains three parts which remove foreign matter from engine inlets, keep each meter separated and in suspension until it's flushed out or is oil changed? This gives oil also contains conductive additives and sealant agents.

In your engine, that means that you can expect longer periods between overhauls than ever before. It means lower repair and maintenance costs.



It means that you can practically forget about engine oil.

But don't forget to order our Gullbirds Aviation Series D.

LITTLE KNOWN FACTS DIFF.

We get a convenient Perch Pilot who would be right!

Yes (Tip) A jet engine female version of the opposite sex? Just as a lot of Little Birds in fact. And, well known, and not just in fact every single one! But.

Thickman was trying for the fastest comparison that we give to anyone who reads us 5 facts that we use.

But we can only use 5 of our Little Birds. But if you want, you can get a comparison to a Perch Pilot (Gullbird) and maybe that'll come up with a couple more come. Love us. Like these.

The first U.S. Army leaves were one of four animals brought around in 1961.

A tapestry plane is depicted in a coat of arms.



by the equivalent of 20 family size refrigerators!

40% of all new airline aviation flying in 1970 was done in 2 planes, 414 hp or 414 hp!

Thinker, But, How about getting some of your readers to send us some facts? Tell us a post card if do.

Just mail them to the address above.

Gulf Oil Corporation and Gulf Refining Company...makers of



ENGINEERING

Bomber Designers Face Range Barriers

Diminishing returns seen with increase of size and weight of craft. Gas turbine offers little aid.

By Ivan H. Deigo *

shown in the air. This can be expressed

$$R = R/P \quad (1)$$

and R is determined by the fuel consumption and the amount of fuel consumed. Thus,

$$R = W/P \quad (2)$$

The fuel consumption is a function of airplane speed and "altitude" obtained from the fuel flow in the engine, so that

$$R = F/M \quad (3)$$

The altitude, expressed in standard miles per second of fuel, may be obtained by rewriting Eq. 3 as

$$R = F/M \quad (4)$$

which equals standard miles/second multiplied by hours/second, and equals units of miles/second.

$$R = 1500/P \quad (5)$$

The speed, V , in knots, may be obtained by the relationship $P = DV/325$, which may be rewritten

$$P = 1500/D \quad (6)$$

Fuel consumption depends on the power being used, propeller efficiency and specific fuel consumption. Thus,

$$P = P_{FC} \quad (7)$$

Substituting these values in Eq. 4 gives

SYMBOLS FOR THIS ANALYSIS

- A, area, square centimeters, ft.
- B, specific fuel consumption, lb./hr. ft.
- C, thrust, lb.
- D, drag, lb.
- E, energy, ft-lb.
- F, fuel consumption, lb./hr.
- G, weight, lb.
- H, height, ft.
- I, weight, lb.
- J, weight, lb.
- K, weight, lb.
- L, weight, lb.
- M, weight, lb.
- N, weight, lb.
- O, weight, lb.
- P, weight, lb.
- Q, weight, lb.
- R, weight, lb.
- S, weight, lb.
- T, weight, lb.
- U, weight, lb.
- V, weight, lb.
- W, weight, lb.
- X, weight, lb.
- Y, weight, lb.
- Z, weight, lb.

Note: All dimensions are in standard units and units.

$$M = 1500/P \quad (8)$$

The drag, D , of the airplane may be expressed as

$$D = W/P \quad (9)$$

$$D = W/P \quad (10)$$

$$D = W/P \quad (11)$$

$$D = W/P \quad (12)$$

$$D = W/P \quad (13)$$

$$D = W/P \quad (14)$$

$$D = W/P \quad (15)$$

$$D = W/P \quad (16)$$

$$D = W/P \quad (17)$$

$$D = W/P \quad (18)$$

$$D = W/P \quad (19)$$

$$D = W/P \quad (20)$$

$$D = W/P \quad (21)$$

$$D = W/P \quad (22)$$

$$D = W/P \quad (23)$$

$$D = W/P \quad (24)$$

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$$D = W/P \quad (29)$$

$$D = W/P \quad (30)$$

$$D = W/P \quad (31)$$

$$D = W/P \quad (32)$$

$$D = W/P \quad (33)$$

$$D = W/P \quad (34)$$

$$D = W/P \quad (35)$$

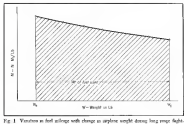


Fig. 1 Variation in fuel along with change in airplane weight during range flight.



Masterpiece of Precision

430 H.P. main gear box of approximately 52 to 1 reduction for the Sikorsky S-51 Helicopter.

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The difference between W_p and W_v is the weight of fuel expended during flight. Since the wing is the product of the amount of fuel used W_p , and the average endurance in miles per pound, M , the cross hatched area in Fig. 1 represents the range of the plane.

If the line representing M_{max} (shown top of figure) is straight, then average mileage is half the sum of the initial and final endurances. If it is not straight, the mean value will be found by other means, simplest of which is the graphical measurement of the area by a planimeter.

The loading area divided by the length of the line representing the fuel load (W_p , W_v) then gives the average height of the diagram and thus the mean mileage. Another method is to obtain the area by integration (a summation of small increments) provided the line is the smooth curve of a function, which it is normally.

By substituting Eq. 10 in Eq. 5,

$$R = 720 \left(\frac{A}{W_p} \right) \left(\frac{L}{D} \right) \left(\frac{1}{W_v} \right) \pi \quad (11)$$

► **Breguet's Formula.**—If the weight of the fuel is taken as a derivative of the weight of the plane dW_p and Eq. 12 is integrated from W_v to W_p , we obtain

$$\begin{aligned} R &= 720 \left(\frac{A}{W_p} \right) \left(\frac{L}{D} \right) \int_{W_v}^{W_p} \frac{dW_p}{W_p} \\ &= 720 \left(\frac{A}{W_p} \right) \left(\frac{L}{D} \right) \ln W_p \\ &= 720 \left(\frac{A}{W_p} \right) \left(\frac{L}{D} \right) \ln \left(\frac{W_p}{W_v} \right) \\ &= 720 \left(\frac{A}{W_p} \right) \left(\frac{L}{D} \right) \ln \left(\frac{W_p}{W_v} \right) \quad (12) \end{aligned}$$

This is the familiar Breguet's range formula and is the algebraic solution for the area represented in Fig. 1. This equation holds true only for product $W_p/L/D$ is constant throughout the whole flight as in a pure maximum range flight. The mean power/galileo solution must be employed if this is not the case. Although this product may vary under some circumstances (such as variation in speed and power settings required by the mission), Eq. 12 is sufficiently accurate for first approximations and is very widely used for this purpose.

Since $F = W_p - W_v$, then Eq. 13 may be written

$$R = 720 \left(\frac{A}{W_p} \right) \left(\frac{L}{D} \right) \ln \left(\frac{W_p}{W_v} \right) \quad (13)$$

This, in turn, may be rearranged as

$$R = \frac{720 \left(\frac{A}{W_p} \right) \left(\frac{L}{D} \right)}{\ln \left(\frac{W_p}{W_v} \right)} \quad (14)$$

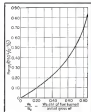


Fig. 2 Solution of Breguet range formula.

This equation gives the amount of fuel required, in terms of percentage of gross weight, to fly a given distance. Fig. 2 gives the results of a series of solutions of this equation.

Using this chart in the graphical solution of Fig. 15, it is possible to make a fairly accurate first estimate of the percentage of gross weight that must be allowed for fuel when the aerodynamic characteristics and the propulsive and engine efficiencies are known.

Top 17 and 18 give no indication of the size or weight of the plane that will result if the range is increased indefinitely, only the ratio of fuel weight to gross weight is given.

It is evident that some limit to the ratio must exist. It can never be 100 percent, since the airplane must weigh something with no fuel aboard, nor can it be zero, since the plane must carry some fuel. The structure, powerplant, control load and equipment will cut up a considerable portion of the total weight. Therefore, before an estimate can be made of how large or heavy an airplane must be for a given range, some estimates must be made of the weight of these items.

► **Weight Factors.**—Gross weight of the plane can be obtained by the aid of eq.

$$W_p = W_v + W_F + W_E + W_G + W_P + W_{LP}$$

To express each of these quantities in percentages of the gross weight, we divide through by W_p .

$$\begin{aligned} 1 &= \frac{W_v}{W_p} + \frac{W_F}{W_p} + \frac{W_E}{W_p} + \frac{W_G}{W_p} + \frac{W_P}{W_p} + \frac{W_{LP}}{W_p} \\ &= \left(1 - \frac{W_F}{W_p} \right) + \frac{W_F}{W_p} \left(1 + \frac{W_E}{W_F} \right) \end{aligned}$$

By considering the oil and oil tank, its weight is a function of the fuel weight and by arranging terms, this may be written



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Castings
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a NEW
casting process
which assures
greater
uniformity
of metal
structure

$$\frac{W_s + W_p}{W_s} = 1 - \left[\frac{W_s}{W_s} + \frac{W_p}{W_s} \left(1 + \frac{W_p}{W_s} \right) \right] \quad (4)$$

Eq. 15 and Fig. 2 give a solution for one of the ratios of Eq. 16, W_p/W_s , and if the other can be isolated, the formula can be solved. The size of the equipment, W_s , and useful load, W_p , items is specified by the processing issues for any given engine design, so that when the ratio allowable for these loads is found from Eq. 16, the gross weight is determined.

The percentage structural weight depends upon a number of factors, which cannot be expressed simply. Engine load factor, wing span, wing thickness and fuselage dimensions all affect this ratio. It is probable that the value will lie somewhere between 15 and 35 percent.

Combining Eqs. 6 and 9 gives $P = (W_p/V)(1/126 L/D)$, therefore

$$\frac{P}{W_s} = \frac{P}{W_s} \quad (17)$$

Value $p = W_p/P$ may be obtained from the manufacturer's engine specifications. Thus

$$\frac{W_p}{W_s} = \frac{Pp}{126 L/D} \quad (18)$$

Since the least percentage of fuel to gross weight will be obtained when L/D is a maximum, this value may be determined from Eq. 11 and inserted in Eq. 18. The value for the speed at maximum L/D may be expressed algebraically as:

$$V_{L/Dmax} = \frac{11.3}{\sqrt{C_{Dmax}}} \left(\frac{P}{W_s} \right)^{1/2} \quad (19)$$

Substituting Eqs. 11 and 22 into 15 gives

$$\frac{W_p}{W_s} = 0.417 \left(\frac{P}{W_s} \right)^{1/2} \left(\frac{C_{Dmax}}{C_{Dmin}} \right)^{1/2} \quad (20)$$

It will be noted that the value of Eq. 20 depends on the speed v or intake thrust in Eq. 11, namely the square ratio and the profile drag coefficient. It also is influenced directly by the wing loading and indirectly by the static density. This means that as the response, in wing loading, to an increase in cruising altitude, center of gravity increases in the percentage of power plant weight to gross weight.

All of the quantities in Eq. 20 are found readily except the value of C_{Dmax} , which must be estimated. As a first approximation, this quantity may be assumed proportional to the total wetted surface area of the airplane and a "cleaner" factor dependent on the airplane type. The latter varies from 0.03 for very clean jet aircraft to about 0.08 for the conventional

type using air-cooled piston engines. Therefore,

$$C_{Dmax} = 0.005 (0.006) A_w/S \quad (21)$$

From Eq. 21 an estimate can be made of the power plant percentage weight required to fly an airplane at v speed for maximum L/D , or greatest range. Then, with the ratio of fuel to gross weight determined from Fig. 2 and the structural weight estimated, it is possible to solve Eq. 15. The effect of oil and baggage weight may be accounted for by increasing the fuel percentage 12-15 percent.

In a cockpit from Fig. 16 that, in the sum of the structural, grossweight and fuel ratios approach unity, the percent age allowable for useful load and equipment approaches zero. Since no airplane is useful without some equipment and useful load, it is evident that such a design is an impossibility. Rewriting Eq. 16 gives

$$\frac{W_p}{W_s} = 1 - \left[\frac{W_s}{W_s} + \frac{W_p}{W_s} \left(1 + \frac{W_p}{W_s} \right) \right] \quad (22)$$

An examination of the mathematical presentation of the distance above demonstrates that as the sum of the structural, grossweight and fuel ratios increase toward unity, the airplane will increase in size very rapidly, finally becoming impossible of visualization without an astronomical gross weight.

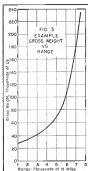
Since, for any given design, the values of W_p/W_s and W_s/W_p will remain substantially constant, Eq. 22 demonstrates the decrease in gross weight as the values assumed in plotting Fig. 3. Each of these factors produces a different effect on range and, although some of these can be improved to a limited extent, in many cases the limits to deterioration is obvious.

To reduce the gross weight for a given range at, constantly, to increase the range for a given gross weight, it is necessary to:

1. Increase the clearance of the airplane by reducing the factor for radiator drag—Lowest value for this factor that has been observed in flight test is about 0.003, which applies to very clean aircraft. This was achieved by using extremely thin wings with a smoothly air-fair face, but such wings usually involve a weight penalty since thicker skin and heavier spar construction must be used.

The use of turbojets is feasible in reducing the drag coefficient but, unfortunately, the specific fuel consumption is increased by this powerplant, about double that of reciprocating engines.

Efforts toward drag reduction are slowly being made by the use of laminar-flow-coated aircraft (Aviation Week, Nov. 26, 1955), flush corners,



The absolute relation between range and useful gross weight will change, for better or worse, as the various parameters are changed.

If Fig. 3 is to be improved so that any given equipment and useful weight may be carried a desired distance with reduced useful weight, a whole series of factors must be more favorable than the values assumed in plotting Fig. 3. Each of these factors produces a different effect on range and, although some of these can be improved to a limited extent, in many cases the limits to deterioration is obvious.

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Tabulation of Values Assumed in Plotting Fig. 3

$$\begin{aligned} C_{Dmax} &= 0.005 \\ A_w/S &= 0 \\ L/D_{max} &= 16.5 \\ v &= 73.6 \text{ ft/sec} \\ p &= 2.0 \text{ lb/ft}^2 \\ W_s &= 50 \\ W_p &= 10 \text{ lb/ft}^2 \\ \frac{W_p}{W_s} &= 0.2 \\ \phi &= 1.00 \text{ (at sea level)} \\ \frac{W_p}{W_s} &= 0.417 \times \left(\frac{73.6}{10} \right)^{1/2} \\ &\times \left(\frac{0.005}{0.003} \right)^{1/2} \times \left(\frac{1.0}{1.0} \right)^{1/2} \\ &= 0.417 \times 2.71 \times 1.0 \times 1.0 \\ &= 1.13 \\ W_s + W_p &= 60 \\ \left(1 + \frac{W_p}{W_s} \right) \left(1 + \frac{W_p}{W_s} \right) &= 1.56 \\ 126 L/D_{max} &= 126 \times 16.5 \times 10/50 \\ &= 21,000 \end{aligned}$$

external rockets, internal NATO units, etc., looking toward achieving these goals both for their increased range and high speed advantages.

Another method for improving the L/D ratio is to increase the wing area. The induced and parasite drag are then reduced by reducing the speed at maximum L/D . However, additional weight of the area must be calculated carefully to the point where it just begins to affect fuel weight.

2. Decrease the ratio of total exposed surface area to wing area—This can be done by reducing the wing area, softening the wing, increasing the air-wing smoothness (American West, Dec. 20, 1955), or the most promising suggestion for achieving smooth wings. However, certain stability and control problems must be solved for that type, the present solution being to use an increased wing area, which reduces the gross that might otherwise be achieved.

3. Increase the aspect ratio of the wing—An improvement in this factor can be made but at a sacrifice in wing structural weight. An increase in this factor places greater emphasis on the structural rigidity of the wing. Flatter (lower) of a wing are dependent on the relationship between its bending resistance and torsional rigidity, and consequently the structural weight of the wing may depend more on torsional rigidity in the design than on bending resistance and load factor.
4. Improve the propulsive efficiency—

It is possible that further development on propeller will naturally change the present concepts of propeller efficiency at high speed. It is not possible at present to estimate any specific values that may be obtained.

Improvement in the present 35-50 percent limit of efficiency appears likely to be controlled by a very natural amount of weather speeds. At very high forward speeds, however, it is probable that 70 percent may be the limit.

If a turboprop engine is employed, propeller efficiency can never be along with 50 percent steady and will probably never exceed 47-48 percent. Nothing whatever can ever be done to exceed these values and they demonstrate the future usefulness of turboprop power for very long range.

•Lower the specific fuel consumption—It appears that the limit has been reached as present piston engines but by adding weight to the propulsor in the form of reducing engine weight, losses passed back into the engine, a reduction of 25-28 percent has been estimated. However, this requires a natural increase in powerplant weight.

The consequences of the turboprop and turboprop units may be countered by increase in compression ratio, higher operating temperatures, adjustable jet exhaust nozzles and auxiliary devices, all of which, however, increase the powerplant weight.

The two turbine engine types obey less entirely different from those of piston engines (Aviation Week, Nov. 15, 1948). Specific fuel consumption decreases sharply as the engine speed increases and decreases more slowly with increase in altitude. From Eq. 19, if the speed for maximum L/D is to increase, either the wing loading must be lower or the lift must be made at high altitude.

A higher loading results in a lower structural weight percentage but from Eq. 20 the rate of powerplant weight to gross weight must increase, all other factors being equal.

•Reduce the wing loading—This will reduce the percentage of powerplant weight from Eq. 20 but will increase the structural weight percentage. This is contrary to the trend necessary for better fuel consumption on turbine engines.

•Increase the power loading—There is the most effective single factor in increasing range, since a 50 percent reduction in the power used can double the range. But this device creates other performance deficiencies and doubling of the power loading would double the lift/drag ratio, cut the speed 30 percent and reduce the rate-of-climb 55 percent, extremely serious penalties in pay.

•Reduce the rate of engine power to

engine weight. The present piston engines have reached their limit for all practical purposes. The turboprop and turboprop offer considerable improvement in this respect but at a sacrifice in specific fuel consumption.

•Reduce the percentage of structural weight—This has been slowly decreasing through the years as improved techniques, materials and design methods developed. Only remain for a substantial gain at the moment, however, is by reducing the design load factor of the airplane but this creates grave risks of failure due to gust loads, which are already indicating the necessity for even increased load factors in large, high-speed aircraft.

The load factor may be reduced temporarily for altitude by overloading the airplane but maneuvers are usually restricted until enough fuel has been used up to remove the load factor to its design value.

Other solutions are increasing wing thickness, reducing aspect ratio and increasing wing loading but all of these factors have harmful effects on other quantities that should be improved.

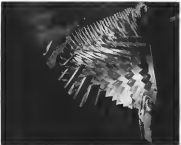
An individually promising as each of these approaches to the problem may appear, none equals in importance the solution of the proper airplane design as a means for range increase. All of the previously mentioned gains are

induced by the assumption that every thing else about the airplane is held constant while a single parameter is varied. In actual practice, this is impossible.

The individual gains in efficiency, even if they are substantial, have only a minor effect on the range of a given airplane. For example, in a typical aircraft design studied, the cruise range was increased 1 percent by a 1 percent reduction in specific fuel consumption, or a 2 percent reduction in profile drag or a 1 percent reduction in structural weight.

Most engineers are convinced that a bomber with a 10,000 mi. range is truly needed. But this result can only be obtained with an airplane which is economically constructed and which has a low probability of success. The long time spent over enemy territory reduces the chance of reaching the target and returning home. Two low cruising speeds increase the liability of fighter interceptors.

Actually, the general performance trend is in the opposite direction—towards high performance at a sacrifice in range—and the problems of extending the range of operations will probably be solved only by such engines in the air as the present engine, because of its stage load loss close to the engine and light refueling.



SOURCE OF THE BIG WIND

Key component in expansion of wind tunnel research potential of National Advisory Committee for Aeronautics is the new 800-hp 7-1/2-in. and flow computer for 4 x 4-ft supersonic test facility, world's largest, at

Levon Flight Propulsion Laboratory, Cleveland. Site of installation is indicated by arrow (lower right) who is looking over blades on rotor. In background is wing covering test Mach.

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For many years Mid-Continent has used Wilcox ground station transmitters and receivers exclusively. These proven performance, dependability, and easy maintenance earned the choice spots for MCA's airborne communication equipment.

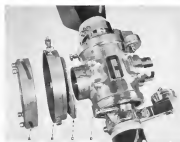
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Manually selective device affords infinite number of prop. settings. Adaptable to standard models of prop.

A simple mechanical linkage supplementing, at the will of the pilot, the automatic operation of the Aeromatic propeller by providing selectivity of engine speed is being fabricated for production models of this aircraft, made by the Propeller Department of Kopylov Co., Inc. It may be fitted to all standard models of the prop.

The new manual selective device, designated "Strut-Crank," consists of two principal parts—a cam plate mounting attached to the engine thrust bearing cover, and a thrust plate housing related when pilot operates the engine prop control.

When the thrust plate is pushed as the thrust plate housing comes forward on the cam plate, engages the propeller blades and rotates them to a selected higher speed position. Pulling the knob out disengages cam by withdrawing the control down the prop.

Adjustment of the control knob's position, inward and outward, allows the pilot to select automatic variable-pitch performance. The propeller self-automatic increase pitch will not be engaged at high climb speed.

During climb at normal altitude, the automatic operation of the prop may be overridden by the control.

For high altitude cruising, the control may be used to maintain speed open on the airplane's ceiling. Thereafter, the infinite selectivity provided by the control permit most precise cruise settings.

Accompanying photo shows the components of the installation. The mounting flange (A) is fastened to the engine thrust bearing cover by a bracket. Flange (B) is fitted with guide pins that travel in the flange recesses when the housing is rotated by the cockpit link.

At the housing recess face or aft, it carries the thrust plate (C). The latter, mounted on a ball thrust bearing to the housing so that it will rotate with the propeller, accommodates a sleeve with a keyway to mate with the key on the ball lens.

The thrust plate is positioned to contact the counterweight arm thrust bracket (D) attached to the blade. Thus, when the engine control is pushed in the high-speed direction, the housing rotates and is moved forward carrying the thrust plate forward so the ball lens until it contacts the thrust bracket attached to the propeller counterweight.

When these brackets are pulled forward, the blades are rotated to the high-speed position.

A pinion fitting is provided as the housing for lubrication of the control assembly.

Control is equipped with a vernier adjustment providing extremely fine increments of engine rpm.

Mounting of the control is facilitated through a covered bulkhead plate to a bracket to the cowling flange.

The tube carries a maximum load of only 18 lb.

Extraneous weight about 11 lb, including control cable and attaching parts.

Canada Sponsors University Tunnel

Canadian Department of Natural Resources has approved a grant of \$350,000 to the University of Toronto for supervisory research. Of this total, \$250,000 is to be used for building modifications and the construction of a supersonic wind tunnel capable of Mach 16.

The accounting \$100,000 is to be used to cover operating costs over a three-year period.

The tunnel is patterned after the German "Kochel" installation, currently placed in operation by the U. S. Navy at White Oak, Md. It consists of a large sphere from which air is pumped to a near-vacuum. When the tunnel is opened, air is drawn through the tunnel and into the spike.

Although this system restricts tunnel testing time to a matter of seconds, it is extremely economical with respect to power.

Shows Jet Vibrations

Amplitude, velocity and acceleration of vibrations of the General Electric TG-100 turboprop in flight are being analyzed with the aid of an instrument mounted on the control panel.

This meter, developed at GE's general engineering and consulting laboratory, Schenectady, N. Y., is capable of measuring up to 200 vibrations per sec. Its detector is a small gage which converts engine vibration into electrical impulses.

In tests, several of the detectors are mounted at engine locations where vibration is most critical. The electrical impulses obtained are amplified and registered in the panel instrument.

High-Heat Oil Tank

A new type of oil tank, designed to afford greatly increased safety from fire hazards—particularly as operation of bomber aircraft—has been developed by the U. S. G. Goodrich Co., Akron, Ohio, for the U. S. Navy.

Reported to be the first of its kind, the flame-resistant container has an outer shell of synthetic rubber reinforced with rayon strands and a capable of withstanding a heat of 2800 F. It is also bulletproof.

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FINANCIAL

CAB Gives Itself More Problems

Its policy statement tells what should be done, but leaves unanswered the big question of how.

In a full measure of orders, the Civil Aeronautics Board recently created a regulatory atmosphere which carried messages of hope for most airlines and fears for others.

The near-term implications are that carriers badly in need of help would have their credit positions bolstered by temporary mail relief payments. While the promise of closer cooperation with the Reconstruction Finance Corp. and the Bureau of the Budget heralded a more liberal loan policy toward the airlines, the road pattern for each help is yet to be defined.

A key feature of the Board's rate action was the reversal of last year's decision not to absorb losses due to the grounding of aircraft. In establishing the principle that such costs are non-reimbursable through the mail rate, CAB freed a positive amount of \$1 million each for American, United and TWA.

► **Deposits**—It is obvious, however, that some deposits exist in the air fare determination and adjustments must surely follow. For example, Aeromexico had a larger number of DC-4s in service than United at the time of the grounding. Traffic demands were higher when TWA Constellation's were inoperative due to mechanical malfunctions. How are these losses to be recovered? Is a profit going to be allowed on traffic that was not covered on these grounded planes had they been in service?

These are but a few of the problems involved. Yet this plan is very simple compared to the determination based on other decisions by the Board as a result of its own actions.

► **Road Studies**—Visitors' route suggestions where traffic does not appear to support existing routes are slated for a full investigation so that proper adjustments may be made.

The key segments involved are Chicago-Washington, now served by Capital, American, TWA and Aeromexico, Washington-Detroit-Twin Cities operated by Capital and Northwest, and New York-Detroit flown by Capital, United, American and Northwest.

Important in these studies are, they must be viewed in addition to the other investigations launched by the Board as

well as appeared in the light of continuing regulatory policies.

A major investigation will appear as to the reasons for the differences in mail pay requirements among the "Big Four" and to determine to what extent these differences may be due to unaccounted and reflected management and to the policy intended action to be taken by the Board or the carrier to eliminate or decrease dependence upon "road" and payments.

Other steps will curtail the cost of the domestic trunk lines of transporting the mail and the factors which determine the fair rate of return on the investment.

► **Carrier Services**—Western Airlines and Northwest are both slated for an examination as to how they may best be integrated with the rest of the air transport industry. The order on Western is noteworthy as the possibility of her pending an certificate is raised, whereas that rest is now for Northwest.

These and other investigations launched by the Board are very serious undertakings. It is believed that most phases of these surveys have previously been attempted by the Board without conclusive action. The carrying forward of all of these projects at this time will impose a tremendous burden on a staff now under crushing pressures from other pending actions.

Further, all of the carriers involved in these investigations are required to prepare and submit extensive materials in answer to detailed questions requested by the Board. For the mail part, such data is stipulated for submission within 60 days after Feb. 21, 1949, the date of the manner of the orders. The preparation of such information will represent a costly and time-consuming operation extending well beyond the period specified.

This phase has its ironic aspects in that Eastern and American, which are accorded no temporary mail pay relief, are penalized in the added costs that they are well be forced to absorb in compiling materials which, as clients, are expected to show the reasons why they do not need the same amount of help that necessary for others in the "Big Four."

► **Conflicting Forces**—The line of an-

quities being pursued by the Board itself is part in a dual role of securing the air route pattern of the nation. Yet, contradictory forces are set in motion by issuing adequate "road" and payments to all carriers who are candidates for "aid."

No airline management which is kept alive by relief and pay is going to be released to accept reasonable margin terms, to any extent of being ordered to make a full drive toward greater cost consciousness. Thus as shall pollute the status quo of the air transport industry and realize subsequent changes that much more difficult.

An investigation as to the feasibility of domestic mail pay relief was announced every month ago. Thus far, very little of a conclusive nature has resulted from the survey. With the cases in the Western and Northwest now clearly defined, it is probable that these proceedings will be greatly expedited.

► **More Action**—While this background appraisal, it would be a mistake to anticipate immediate action on any but sweeping changes in the composition of the airline map.

Recent moves definitely indicate, however, a greater trend toward increased government participation in airline affairs. While such aid is in the form of increased mail pay and loans may prove very welcome to the carriers concerned, it is surrounded with undesirable aspects in that the industry will have a heavier load on the right to demand greater freedom in the conduct of its operations.

It is significant that while Eastern and American appear to have been suggested and, in fact, even provided by recent Board regulatory actions, actually they may be the main beneficiaries as the final analysis. Most definitely they will be in the best possible position to meet government intervention in the conduct of their operations. Reduced to practicable measures this means that remaining on a "service" route rate, Eastern and American may be entitled to develop additional earnings with no serious loss of having the rate of return on the investment reduced through a cut in mail payments.

—Sieg Altschul

Stock Transactions

Recent stock transactions, as reported to the Securities and Exchange Commission, include:

- **Boeing**—A stockholder purchased 1,100 Boeing shares from United States National Bank and Investment Corp. in January, amounting to ownership 10.11% of the total.
- **Boeing**—A stockholder purchased 100 shares of Boeing stock from United States National Bank and Investment Corp. in January, amounting to ownership 1.01% of the total.
- **Boeing**—A stockholder purchased 100 shares of Boeing stock from United States National Bank and Investment Corp. in January, amounting to ownership 1.01% of the total.
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BRIEFING FOR DEALERS & DISTRIBUTORS

PLANE-O-TOL—Southwest Airplane Co. is building an "Elasticity Plane-O-TOL" adding storage facilities for 10 two-engine executive planes or 20 single-engine craft, at Love Field, Dallas. The 400-ft. by 40-ft. steel structure is expected to be completed June 1.

BRAYTON DEGREE—Brayton Flying Service, Inc., at LaGuardia Field, St. Louis, has been authorized by Missouri secretary of state to confer degree of Bachelor of Science in Aeronautical Engineering upon graduates of the two-year Brayton course. Graduates are required to pass tests for CAA airplane and engine mechanics license and private pilot license, in addition to their engineering studies, which include design, aircraft law, aerodynamics and materials strength.

OVERHAUL CONTRACTS—Airwork Corp., Middleville, N. J., has been awarded contract for engine overhaul for All American Airways for the next year. The company, which specializes in engine work and is a Pratt & Whitney distributor, also has contracts for overhaul with CAA, TWA, international airlines, and Colonial Airlines.

REDUCED STORAGE—Reduction in hangar need for the new four-place Piper Clipper from the usual \$15 to \$10 a month has been announced by Ted Hahner, president of Sales Flying Service, Tempe, N. J., because the short-winged Clipper occupies less space and is easier to move in a hangar, he states. Other Piper distributors are expected to make comparable reductions.

VA DELAYING ACTION—As of Jan. 1, Veterans Administration reports, there were 53,543 GI students in flight training. During the preceding six months VA received 27,475 applications for flight courses. Less than half of these were approved. The other 14,023 were taken under advisement with regard for better justification of the vocational nature of the training desired. Up to the first of the year 11,007 of the ones under advisement were still dangling without decision. VA had approved 1912 applications and disapproved 1416. Critics of VA policy point out that the delaying action is an effective means of halting the flight program without assuming the cost before Congress actually rejects the applications.

779 AGRICULTURAL OPERATIONS—Analysis of statistics supplied to National Aviation Under Arm by CAA and Department of Agriculture shows a total of 779 flights operated in the U. S., or an average of approximately 16 in a state, are now engaged in crop duster, spraying, seeding or other agricultural aviation activities requiring issuance of aviation operating certificate. California has 96 operators in such activities, Florida a second with 58 operators and Kansas in third with 47. Other leading states: Iowa, 35; Colorado, 28; and Washington, and Nebraska, 26 each.

CROSSWIND GEAR AGAIN—Goodyear Aircraft has its crosswind landing gear available now in optional extra equipment on the British Aviat Aviat, described as the leading British utility lightplane. British "Tiger" magazine reports enthusiastic reception of the "anti-slip landing undercarriage" and claims that a small number of sets of components are being made up by Goodyear, "but should there be a large demand more may be made available, possibly at a lower cost."

Current price quoted for the Aviat increased which installation in England is approximately \$500. Sales of the gear in Britain and other export sales, while small individually, will add to the general acceptance of the crosswind wheel, and combined volume may make possible larger production with resultant economies both for British and American users of the coloring wheel.

—ALEXANDER MCMURRY

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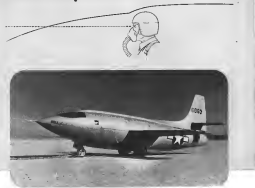


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AIR TRANSPORT

Skycoach Expansion Gets CAB OK

Popularity of cut-rate nonstops expected to warm up Northwest's transcontinental proposal is approved.

Proposals for wide expansion of the scheduled "aircraft" from coast-to-coast domestic operations have received the green light from the Civil Aeronautics Board, thereby paving new thrusts to continue nonstop scheduled operations.

Northwest Airlines was slated to announce the first scheduled transcontinental lowest fare flights late last week with roughly 50-passenger DC-4s between New York and Seattle on the West Coast and other points. Fares at \$97 one-way compare with the first-class rate at \$167.55.

■ **New South for Capital-Gates** definitely sets its approval of NWA's new Skycoach operation, Civil Aeronautics Board, to open 60 per cent DC-4 coach service between New York and the Twin Cities starting May 24 and between Washington and Chicago starting April 1. The first coast-to-coast fare of these two routes—as on Capital's original New York-Pittsburgh-Chicago "Nightbird" flights—represents a 35 percent reduction from first-class rail rates and opens for air travel.

Meanwhile, there could be developments outside the scheduled program.

■ **TWA**, which has been operating transcontinental service between Kansas City and Los Angeles since Feb. 7, and it would add CAB for authority to start regular flights between New York and Kansas City starting May 1. TWA wants to change the expiration date of the Kansas City-Los Angeles Skycoach route from Apr. 30 to July 31 and to extend the service to San Francisco.

■ **Inter** between Kansas City and New York would be at the same low-cost level prevailing on the Kansas City-Los Angeles run, but through transcontinental routes will not be offered on the transcontinental flights.

■ **CAB** has scheduled a preliminary conference for Apr. 4 to discuss the certificate authorizing transcontinental coach-type service. An unscheduled question is already in the case-North Air Transportation Service, Viking Air Inc., Airline Transport Council, Standard Air Lines, Air America and Eastern Airways.

■ Independent Sky Coach System, Inc., has asked CAB for a certificate to

operate at least to conduct extensive passenger-type operations. Inquiries often coming to the commission would cooperate in offering services similar to those provided last week by the National Transport System.

The strongest association of member operators would establish agencies for the sale of through tickets and for baggage checking, set up joint air coach depots, arrange for advertising, public and distribute joint traffic and consolidated fare tables, promote the interchange of business between major inter-coastal routes at junction points, encourage adoption of uniform rates, fares and charges, and promote the adoption and enforcement of a code of conduct.

Flight Radio Union Protests to Congress

Flight radio personnel, faced with the prospect of losing their \$588 per month jobs to pilot-operated radio-telephones, have asked Congress to stop

Pan American Airways from using radio-telephones in Stateside routes which start operating on the West Coast from May 1.

In a letter to members of the Senate and House of Representatives and to the Secretaries of Labor and Commerce, Michael J. Quill, president of the Transport Workers Union of America (TWU), with which Pan Am radio telegraphers are affiliated, appealed for a Congressional investigation aimed at looking into radio efforts "to eliminate radio-telephony for radio-telephony almost across operating routes."

The TWU leader contended that the use of radio telephones is "not only a waste of radio frequency energy but also a danger for greater economy at the expense of efficient and safe operation."

Radio telephones, he asserted, will be the responsibility of the pilot "who is already overloaded by his duties in operating the most complicated craft in conventional air travel."

Quill requested legislation to compel all aircraft on over-water flights to maintain radio-telephony contact as a frequency of 101.4, the internationally accepted channel for distress and rescue communications.

Pan Am officials point out that the airline has been using radio-telephones successfully on the New York-San Juan and New York-Buenos Aires run for about a year.

They claim this equipment is an improved means of communication which is bound to come into more widespread use for over-water flights, and has been used by all domestic airlines for a number of years.



CROWD PLEASER

Getting full measure of publicity from its position at the head of the Stateside delivery line, Pan American Airways is drawing its big new planes at its U.S. offices.

Here's the result when one was opened to the public at Miami on scheduled 15,000 passengers and visitors turned out to catch the plane during the two-day exhibition.



LIMA-MATUCANA—With heavy borrowing from U.S. designs, the mobile looks like La Guardia. —C



...And the plain, modern, balanced interior has a resemblance to Washington National.

New Airports for South America

Several South American countries have been aggressively building airports while especially so on a par with the United States has to offer.

First of the new terminals to open in the hemisphere is the one at Lima, Peru, which was designed by Skidmore, Owings & Merrill. The new airport has had a constant increase in traffic since its opening last fall.

After U.S. & the terminal building was designed by Marc P. Pardo, who spent much time studying airports of airports at New York, Washington, and Miami before selecting his own plan.

Peru's airport is operated by CORPAC (Corporación Peruana de Aeropuertos y Aviación Comercial), a government agency established in 1945 to improve and manage aviation facilities through out Peru.

CORPAC also runs 58 other airports, 21 of which are currently being modernized and expanded as part of its overall program.

Most of CORPAC's revenue comes from flat rates charged each airline for each kilometer flown over Peruvian territory, according to the type of aircraft used.

For Bogota-based TACA, the cost of all airport facilities plus navigational-aid and meteorological services, with charges broken down as follows: 8.2 percent for negotiated since construction, 32 percent for point-to-point construction, 6 percent for meteorology and 46.8 percent for landing fees.

According to CORPAC's rate scale, a U.S. carrier operating a DC-6 which makes a scheduled stop at Lima and continues along the west coast of South America would have to pay \$349.74 per flight.

CORPAC also charges a 2 percent fee on tickets of passengers flying over Peruvian territory and does additional income from various airport revenues.

Peru's Aires-Argentina's new air

port, Buenos Aires, is to be one of the largest in the world—under construction near Buenos Aires and is expected to be in operation by this spring.

Aires will have two runways capable of supporting as much weight as those built at Midway. A third runway—3,513 ft. long—will be able to handle planes twice as heavy as any now in existence.

Aires is designed to accommodate two transports on its apron at one time and will have twelve gates with coast-guard immigration, customs, health and police inspection facilities available to international carriers. An additional nine gates will be reserved for domestic operations.

According to some GAA officials who recently inspected the site, the new airport will be even better than Midway. • Montevideo—Uruguay, Argentina's next door neighbor, already is achieving some of the facilities recently not dreamed at Carrasco National Airport, near Montevideo.

For the past few months, commercial airlines have been using the 3,750 ft. runway—a fourth runway of aprons match the same length will be completed by this summer. New hangars and a terminal building will also be opened soon.

Uruguay currently has the largest airport facilities on the east coast of South America.

Foreign Lines Ponder Europe Tourist Fare

International airlines are shopping carefully around Pan American's proposal for a \$400 roundtrip tourist fare to Europe (Airmen's Weekly, Mar. 14).

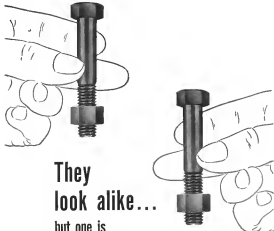
While foreign carrier officials express the desire for tourist fares, many are quick to point out at the same time that most of the airlines may not be able to operate profitably at such low rates. Some of the problems they see:

• Airlines using Stratocruisers may be able to operate profitably at tourist rates, but carriers equipped with DC-6s and Constellation may find that such rates won't pay off. Stratocruisers are smaller craft and need standard equipment for all foreign carriers in the low-cost market.

• Because of the different type planes used, it will be difficult to standardize overheads, tourist accommodations, and there might also be a wide discrepancy in fuel-china arrangements. For instance, Montevideo obviously could offer more in the way of facilities and accommodations than the smaller airports.

• IATA members that have been unable to arrive at a satisfactory definition of tourist or first-class service.

• Small airlines, such as Swissair, might be faced with special problems because



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they schedule relatively few flights.

• **Lowest entry** can't be adopted successfully by any airline until IATA members have reached an agreement satisfactory to all. Any carrier attempting to set up lowest rates independently of the others would obviously be prevented from operating in markets owing competing air lines.

Monarch Describes Lightning Effects

A stroke of lightning which landed a DC-3 pilot for three minutes, shattered his windshield and knocked out the plane's radio and all electrical equipment for five minutes has been described in a recent report by Monarch Air Lines.

The San Francisco plane was lost last Dec. 34 while flying between General Francisco and Durango, Colo., on light snow 12,000 ft. above sea level (2500 ft above the terrain). It is believed the plane was about 500 ft below the clouds from which the lightning came. Moderate precipitation sleet was encountered about five minutes prior to the strike, and lightning was observed five miles away.

• **Loss of Radio**—None of the stroke was reported as being "very loud—equal to a traffic explosion." Although the captain was blinded for about three minutes, he suffered no other effects. The first effect was blinded for 30 seconds, with no other effects.

• **Other Damage**—Windshield—Barrage striking the left windshield, the left wing cracked the left side window, burned the paint and pockmarked the skin along the left windshield, and shattered the static dischargers on the right wing tip and rudder. Engine operation continued normal.

While the radio and electrical equipment went out of operation for about five minutes, they subsequently became operative. All equipment functioned normally on the ground check after the landing. No blown fuses, burned wires or other indications of damage to the electrical system could be found.

• **Control Net Abused**—The receiver, a Plessey R16, deflected from the magnetic course of 149 deg. by about 55 deg clockwise. The deflection did not affect the controls, but the crew reported it felt as if the plane had encountered turbulence in heavy turbulence at the time of the strike.

The lightning struck just above the plane's compartment aft of the wing flaps. The damage evidently carried out the right wing and left the inward at the top and above discharge wiper. An after section of the charge apparently carried down the fuselage section and left the fuselage at the static dischargers on the rudder.



John S. Johnson, FAA superintendent of training, explains mechanisms that control pitch of the propeller to two Pan Am engineers who are standing close.

Learning About the Stratocruiser

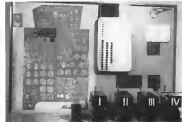
Pan American Airways sets up school for flight crews to study the workings of Boeing's giant transport.

Pan American Airways is giving Stratocruiser flight and ground crews an intensive training program at its San Francisco base, in that the Boeing transport's "all-environment" control system will be thoroughly understood by crew when the craft goes into service Apr. 1.

Captain, first officer and second officer receive 155 hr. of training each, flight engineer, 151 hr., and radio officer 45 hr.

In charge of the ground school is John S. Johnson, PAA superintendent of training. Flight training is under supervision of Capt. Wilfred Fryer, senior route captain.

In addition to the San Francisco training, crews will also get 175 hr. at the Detroit branch, a week-long that simulates flying conditions, and is concentrated to simulate the Stratocruiser cockpit interior.



Flight engineers have to master the 150-hour control cockpit before they graduate.

Numbered levers and switches were hooked up to create problem before.



Control system for rudder is diagnosed by the single monkey.



Mechanical check system which operates looking gun is shown in the shot.

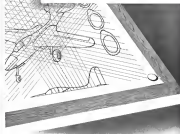


Automatic pilot equipment is tested in place to check out study operation.

facts to remember about

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FASTEST THING IN FASTENINGS

Stunt or Achievement?

Sometimes aviation people let themselves be driven by competition and these arguments. We have heard several times lately about "stunts." Bill O'Brien's 1900 mi. nonstop flight is a "stunt" because North American was a stunt. The Air Force's round the world B-50 nonstop flight was a stunt. So it goes.

New, it seems to me that if there is any group in the world who should appreciate the difference between achievement and a "stunt," it should be those who know what about the business.

If you want to meet about it, the first flight of the Wright Brothers was one of the biggest stunts the world ever saw. So have been most other triumphs of flight, if you are in the dispassionate frame of mind. The fact that some of these technical and technological increases via flight—perhaps publicity may be a temporary source of power to a civil company or a civil air service, but we think, in a business with as much public appeal as aviation has, such publicity has genuine value.

We respect the line and the railroad and the battle ship people would give a lot to be able to see the favorable publicity that aviation gets every year. And the millions and millions of dollars Congress appropriates for new aircraft is not without public approval, you can be sure. So think publicity and aviation achievement for some of those dollars. And another thing, would you rather have an epidemic of such headlines about a "stunt" like Bill O'Brien's or about a "flying rubber duck?"

We think there's a whole lot of difference between achievement and stunts. But if you are going to keep on calling them stunts, while when you do it, please:

Which Will You Bet On?

Here's a study in contrasts.

(1) Pan American, now taking delivery on 10 giant Boeing Stratojets, gets on-line through its aggressive President Jack Tamm that it looks ahead to the time not long distant when it can provide low cost fares to Europe, the Orient and South America, with perhaps a tourist class fare in Europe at something like \$275, contrasting with a round-trip economy rate of \$450. The same airline has paid off valuable experience running 65 passenger DC-4 airplanes between New York and Puerto Rico, and this month it extended coach service to Rio de Janeiro and Buenos Aires.

Says Mr. Tamm: "The people want tourist class air service, and it is a race to stay."

(2) United Air Lines, also soon to take delivery on a first of giant Stratojets, has declined through its President W. A. Patterson, that it does not believe in the air coach type of operation, and has no intention of instituting it.

United is probably the outstanding example of those who control air transportation should be restricted to scheduled luxury service, complete to full round-trip.

It is a most tick that they can do it, but we think United is dead wrong. We think Pan American is both alive and right. We shall watch with keen interest how United fits in to big new airports without any lay-out, while Northwest and TWA are desperately scrambling across the country with special coach planes, several hours slower, perhaps, but more dollar cheaper. And if American doesn't enter this competition before long we will abandon all attempts at low-costing.

Air transportation will never become mass transportation until the masses can afford to use it. Until the masses do we haven't a ghost of a chance of inducing government subsidies. Unfortunately, some industry people seem to have not the slightest concept in cutting down subsidies. They rebel against any new competition, such as the airlines, which might show up any of these current expenditures as unreasonably high or which might act as a yardstick of efficiency. They prefer inefficiency because it pays off better.

There are hard words, but it is difficult to see how much longer we can afford to shovel out subsidies with one hand, while holding off with the other hand all new competition, which claims for an opportunity to show what it can do, cheaper and more efficiently. Public opinion simply is going to bring a change.

We think United, and its school of instruction rather than growth, has made an honest mistake. We also predict that UAL will have a lower fare schedule well within six months. In other words, our bet is on Pan American.

New Services to Readers

Aviation Week sponsors the busy letters of our members from readers on its Yearbook, Edition Feb. 28, An Inventory of U. S. Air Power, its publication last week of the Major Air Transport Facts & Figures with a complete statistical summary of the entire industry, and our recently feature introduced on Mar. 7, reporting latest Air Force contract awards to industry.

These are concrete examples of an aggressive expression in Aviation Week's editorial service to its readers. Other features and services are contemplated, and will appear throughout the year.

We are grateful to you for a constantly growing number of letters, and hope you will continue writing. Constructive criticism and complaints are often most enlightening and helpful than those of praise. If there is any way Aviation Week can be made more valuable to you and your business, why not drop us a line at 375 W. 42 St., New York, N. Y., and tell us how?

ROBERT H. WOOD

In new plane production

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3. Lucite is strong. This relatively high tensile strength (7000-8000 P.S.I.) and heat resistance (100-150 P.S.I.) makes Lucite resistant to flame, thermal expansion, and impact, and stability—resists staining.

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"Lucite" acrylic resin had a distinguished career record in World War II, where it was used for instrument, control, and window, nacelles, and windows of landing equipment, military and private airplanes. After the war, it was chosen for the right choice in the B-29 bomber. "Lucite" is supplied in sheets of various sizes.

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AND TRANSFORMERS

"Top-Flight" engine performance played a large part in the establishment of the new world speed record set by the F-86, powered by a General Electric TG-190 (USAF Type J47) turbojet. "Top-Flight" men also had a large role. One of these men is E. S. "Tommy" Thompson, Manager of Sales for the Aircraft Gas Turbine Divisions, shown accepting one of the triplicate awards made to the Air Force, North American Aviation, and General Electric by the National Aeronautic Association.

Tommy was in on the design and production of the first turbojet engine in the United States—the General Electric IA. Tommy worked with England's Whittle, Air Force officers, airframe manufacturers, and expert design men like Sam Puffer and D. F. "Truly" Warner. He supervised the installation of the historic IA engine and saw it grow from a plan to a practical, powerful reality.

Today G-E research and engineering are continuing to serve the aviation industry by developing and producing engineered systems and precision products for aircraft. Take your problems to the G-E office nearest you, or write *Apparatus Department, General Electric Company, Schenectady 5, New York.*

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